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## ABSTRACT

This document contains a report on state and local emergency medical services programs. It discusses the effect of the transition from federal to state leadership under the block grant and identifies the key issues affecting local delivery of services. The report includes an executive summary and five chapters. Chapter 1 discusses emergency medical services (EMS); the evolving federal role in EMS; and the objectives, scope, and methodology of the report. Chapter 2 examines how states use block grant funds to build on federal categorical initiatives. Chapter 3 concerns EMS access and dispatch and notes that a systematic, area-wide approach eludes many areas. Chapter 4 examines EMS systems seeking greater advanced life support coverage. Chapter 5 looks at cardiac and trauma care and notes that more systematic routing of trauma victims is needed. To avert a potentially negative federal effect on the development of specialized trauma care, the report recommends that the Department of Health and Human Services determine whether federal Medicare and state Medicaid reimbursement rates have an adverse financial impact on trauma centers. Further federal actions that could enhance state and local EMS programs are suggested. An annotated bibliography, seven tables, and eight figures are included. (NB)

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Human Resources Division

B-219181

September 30, 1986

The Honorable Alan Cranston  
The Honorable Edward M. Kennedy  
United States Senate

In response to your March 5, 1985, request and later discussions with your offices, this is our report on state and local emergency medical services programs. The report discusses the effect of the transition from federal to state leadership under the block grant and identifies the key issues affecting the local delivery of services.

We are suggesting further federal actions that could enhance state and local emergency medical services programs.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after its issue date. At that time we will distribute copies to the Secretaries of Health and Human Services, Transportation, and Agriculture; the Chairman of the Federal Communications Commission; the governors of the six states we visited, and other interested parties. Copies will also be made available to others upon request.



Richard L. Fogel  
Assistant Comptroller General

# Executive Summary

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## Purpose

About 550,000 persons die from heart attack and another 140,000 die from injuries each year in the United States. Studies estimate that from 15 to 20 percent of injury and prehospital coronary deaths could be avoided with the delivery of appropriate emergency medical services.

At the request of Senators Alan Cranston and Edward M. Kennedy, GAO reviewed the status of emergency medical services programs in the United States, addressing the following questions:

- What effect did the transition from federal to state leadership under the Preventive Health and Health Services block grant have on emergency medical services?
- What are the significant issues and barriers affecting the appropriate and timely delivery of local emergency medical services?

While recognizing that states are now responsible for operating the program, the Senators also asked us to identify any actions the federal government could take to enhance states' progress.

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## Background

Emergency medical services are best delivered through a well-coordinated system of local providers. While local providers and governments have principal responsibility for delivering services, the federal government assumed a lead role in improving these services through categorical grant programs created under the 1966 Highway Safety Act and the 1973 Emergency Medical Services Systems Act.

In the early 1980's the federal government devolved much of its leadership responsibilities to states by folding the Emergency Medical Services Systems Act program into the Preventive Health and Health Services block grant. This prompted concerns that states would make less funds available for emergency medical services.

Between October 1985 and March 1986, GAO reviewed the activities in six states—California, Florida, Iowa, Massachusetts, Pennsylvania, and Texas—to assess their influence on the local delivery of emergency medical services. Within the 6 states, 18 urban and rural areas were selected for case studies.

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## Results in Brief

Bolstered by the conversion of federal categorical support to the more flexible block grant, states have assumed a more active leadership role

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in financing and regulating the local delivery of emergency medical services. Although initially reducing funds for emergency medical services in the first years of the block grant, the six states GAO visited have reversed this trend, as the emergency medical services community increasingly looks to them rather than the federal government for leadership.

Many local areas, however, have not yet adopted service delivery practices that have been shown to save lives. Quick telephone access through 911 is estimated to be available to less than 50 percent of the nation; advanced life support ambulance services are generally not available in most rural areas visited; and critically injured patients are not taken to the most appropriate hospital in some areas.

Progress in adopting these practices has been impeded by the costs of installing 911 and acquiring sophisticated ambulance services as well as the lack of cooperation among emergency medical service providers. State and local governments are in the best position to provide the primary impetus in overcoming barriers to further progress. Certain federal actions, however, could help enhance state and local leadership efforts.

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## Principal Findings

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### States Assume Leadership Role Under Block Grant

States have reversed the downward funding trends for emergency medical services initially experienced under the block grant. Funding in the six states visited decreased by 34 percent from 1981 to 1983. Although total funding has not returned to 1981 levels, funding increased by 28 percent from 1983 to 1985. Moreover, the states have increased their share of funding from 27 percent in 1981 to 50 percent in 1985.

Under the block grant, states have expanded their regulatory and programmatic roles and have generally kept the regional systems established under the 1973 federal categorical program. As of 1985, states continued support for 76 percent of these regional systems.

Although the block grant has worked well in engaging state leadership, federal highway safety funds expended by states for emergency medical services could be better coordinated with states' overall emergency medical services strategies. Four of the six states have used these funds to

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support emergency medical services without consulting with state emergency medical services offices.

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### **Availability of 911 Varies Significantly**

Although 911 expedites quick public access to emergency medical resources, it is estimated that more than 50 percent of the nation, primarily in rural areas, is still not covered. High installation and operating costs in rural areas GAO visited and the reluctance of urban ambulance services to join an areawide telephone receiving system are among the principal barriers to 911 implementation. While state-mandated coverage and financing arrangements could promote broader coverage, only six states nationwide have mandated 911 coverage and 26 have authorized a special funding mechanism.

### **Advanced Ambulance Care Limited in Rural Areas**

Advanced life support ambulance services, most important to those in critical condition, are primarily found in urban areas. While all nine urban areas GAO visited have these services available to at least 50 percent of their population, only four of nine rural areas have such coverage. Low rural area caseloads often do not provide sufficient revenues to cover advanced life support fixed costs and preclude maintenance of staff medical skills.

States have taken many regulatory actions to upgrade the quality of advanced life support care. Of the 18 local areas visited, however, 10 reported that radio interference hampered communications between ambulance personnel and hospital physicians providing medical direction for field care. The Federal Communications Commission, which allocates radio channels, recently provided more channels, which could ameliorate the interference problem. Further, 10 areas indicated that outmoded communications equipment also limits effective ambulance-hospital communications. However, block grant funds may not be used to purchase new equipment.

### **Many Areas Have Not Adopted Trauma Care Systems**

Although taking severely injured patients to specialized trauma centers increases survival chances, 10 of the 18 areas GAO visited do not have fully developed trauma systems to assure that critically injured patients are taken to these centers. The designation of a hospital as a trauma center may threaten other hospitals in the area with potential loss of patients and prestige. Due partly to these concerns within the medical community, states have done little to encourage the designation of trauma centers.

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The new prospective payment system being implemented in Medicare and being adopted by some states in Medicaid to contain health care costs might discourage hospitals from specializing in costly trauma care. This system reimburses hospitals based on the average costs of treating patients. Trauma centers treating a disproportionate number of severely injured patients may not receive sufficient reimbursement under this averaging method to fully cover the higher costs associated with severe cases.

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## Matters for Congressional Consideration

Although state and local governments are in the best position to foster needed improvements, the Congress could consider actions in two areas to assist state and local efforts:

- A federal loan program financing initial local 911 start-up costs could promote broader 911 coverage, particularly in rural areas, if the Congress decides that promotion of 911 is a desirable national goal. The Congress could explore modifying an existing loan program for rural telephone systems, administered by the Rural Electrification Administration in the Department of Agriculture, to permit existing loan funds to be used by local governments for 911 implementation.
- The current prohibition on equipment purchases in the Preventive Health and Health Services block grant could be modified to permit local areas to replace outmoded communications equipment using block grant funds.

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## Recommendations

To avert a potentially negative federal effect on the development of specialized trauma care, GAO recommends that the Department of Health and Human Services determine whether federal Medicare and state Medicaid reimbursement rates have an adverse financial impact on trauma centers. The results of this analysis should be considered along with other factors in assessing the need for a change in trauma-related payment rates.

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## Agency Comments

The views of directly responsible officials were sought during GAO's work and have been incorporated in the report where appropriate. GAO did not request official agency comments on a draft of this report.

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**Abbreviations**

<b>ACS</b>	<b>American College of Surgeons</b>
<b>ALS</b>	<b>advanced life support</b>
<b>BLS</b>	<b>basic life support</b>
<b>DOT</b>	<b>Department of Transportation</b>
<b>DRG</b>	<b>diagnosis related group</b>
<b>EMS</b>	<b>emergency medical services</b>
<b>EMT</b>	<b>emergency medical technician</b>
<b>FCC</b>	<b>Federal Communications Commission</b>
<b>GAO</b>	<b>General Accounting Office</b>
<b>HCFA</b>	<b>Health Care Financing Administration</b>
<b>HHS</b>	<b>Department of Health and Human Services</b>
<b>PHHS</b>	<b>Preventive Health and Health Services</b>
<b>REA</b>	<b>Rural Electrification Administration</b>

# Introduction

The mid-1960's marked the beginning of the modern era of the systems approach to delivering emergency medical services (EMS). Responding to concerns over the poor delivery of emergency care nationwide, the federal government assumed a leadership role in addressing these concerns. This lead role continued through the 1970's.

In the early 1980's, the federal government devolved more authority to states for many public health areas. Using a block grant approach, states were given broad program and administrative responsibilities over several preventive health programs, including EMS.

In March 1985, Senators Alan Cranston and Edward M. Kennedy requested that we review the progress of EMS under the block grant and identify significant factors that encourage or impede EMS system development.

## Emergency Medical Services

We have defined emergency medical services as the resources used to deliver medical care to those with an unpredicted immediate need outside a hospital and continued care once in an emergency facility. Studies have shown, and EMS experts generally agree, that the efficient and systematic delivery of EMS saves lives and reduces disability. (See bibliography, p. 62.)

The critically ill and injured benefit the most from timely delivery of appropriate care. If their lives are to be saved, individuals with serious injuries or acute cardiac problems must receive appropriate medical treatment as quickly as possible. How quickly? The simple answer is that every minute counts—their lives are measured in minutes—and the faster treatment is rendered, the better. Dr. R Adams Cowley, one of the foremost authorities in the field and director of the Maryland Institute for Emergency Medical Services Systems, has formulated what he terms the "golden hour," indicating that there exists a single precious hour in which to locate and treat a critically ill or injured victim.

To provide timely and appropriate emergency medical care, it is generally accepted that a local emergency medical services system must

- permit fast and easy public access to emergency medical resources,
- quickly dispatch the most appropriate ambulance,
- provide timely and appropriate on-scene care, and
- swiftly transport victims to the most appropriate emergency care facility.

It is also widely acknowledged that a key ingredient for effective performance of each of these phases is the coordination and integration of the area's providers into a coherent system. This helps assure the most successful deployment of the area's medical resources to respond to emergency cases. The existence of an integrated system promotes smooth and efficient handling of a case as it passes through the different phases of care, from the initial call to transport of the patient to the most appropriate hospital.

## The Evolving Federal Role in EMS

Many levels of government and private industry play roles in the delivery of EMS. Generally, the services are delivered at the local level by either local government or private providers. They include such entities as local fire and police departments, public and private ambulance services, and public and private hospitals. States generally provide support for local planning and service delivery, as well as regulatory standards governing the service providers.

The federal government has also influenced the development of local services by providing funding, technical assistance, and guidance intended to upgrade state and local programs. A federal role in emergency medical services was first advanced in the 1960's, when national studies revealed significant problems with the delivery of EMS.<sup>1</sup> The following are examples of conditions during that period.

- About 50 percent of the ambulance services were provided by morticians operating inappropriate EMS vehicles, and ambulance services were often staffed by poorly trained attendants.
- Ambulances had no direct communications with hospitals or with public safety agencies, such as fire and police departments.
- Ambulance service providers did not have knowledge about the level of emergency care available in hospitals within their service area.

Alarming statistics reflected the seriousness of the problems. For example in 1965, heart attack and injury, two leading causes of death, accounted for over 700,000 and 100,000 deaths, respectively. About

<sup>1</sup> Accidental Death and Disability—the Neglected Disease of Modern Society, published by the National Academy of Sciences, National Research Council, in 1966 and Health, Medical Care and Transportation of the Injured, published by the President's Commission on Highway Safety in 1965.

half of these victims died before reaching a hospital. Studies conservatively estimate that 15 to 20 percent of those injury and prehospital coronary deaths could have been prevented with improved emergency medical services; in some areas even greater rates could be achieved.

Responding to national concerns, the Congress included provisions to improve emergency medical services as part of the 1966 Highway Safety Act (Public Law 89-564). The Highway Safety program, administered by the Department of Transportation (DOT), encouraged states to establish standards for and regulate emergency medical services. Complementing state standard-setting and regulating efforts, states were also authorized to use highway safety grant funds to improve EMS equipment and personnel training at the local service provider level. In 1985, states spent \$5.3 million of their \$122 million in highway safety funds on EMS.

In 1973, the Congress enacted the Emergency Medical Services Systems program (Public Law 93-154) to further improve services across the country. The program emphasized the development of regional systems to coordinate emergency medical services, and 303 geographical regions covering the entire country were identified by the states. Typically, these systems covered several counties, and regional coordination activities were usually provided by public or private nonprofit entities.

Rather than financing direct medical care, about \$30 million in federal grants was made available annually between 1974 and 1981 through the EMS Systems Act for the regions to plan, implement, and expand a system of delivering emergency medical services within their respective areas. Each of the 303 regions was eligible to receive grants for up to 5 years, after which they were to become self-sustaining.

In 1981, the Omnibus Budget Reconciliation Act consolidated seven Department of Health and Human Services (HHS) preventive health programs, including the EMS Systems Act program, into the Preventive Health and Health Services (PHHS) block grant. The block grant gave states broad program and administrative responsibilities and significantly reduced HHS's role in those seven programs, including EMS. Specifically, states could now decide whether to use block grant money for EMS and, if so, how best to support service delivery.

## Objectives, Scope, and Methodology

We were asked by Senators Cranston and Kennedy to assess the progress of EMS systems since the inception of the block grant and identify factors that encourage or impede further development of these systems. Based on their request and later discussions, we reviewed

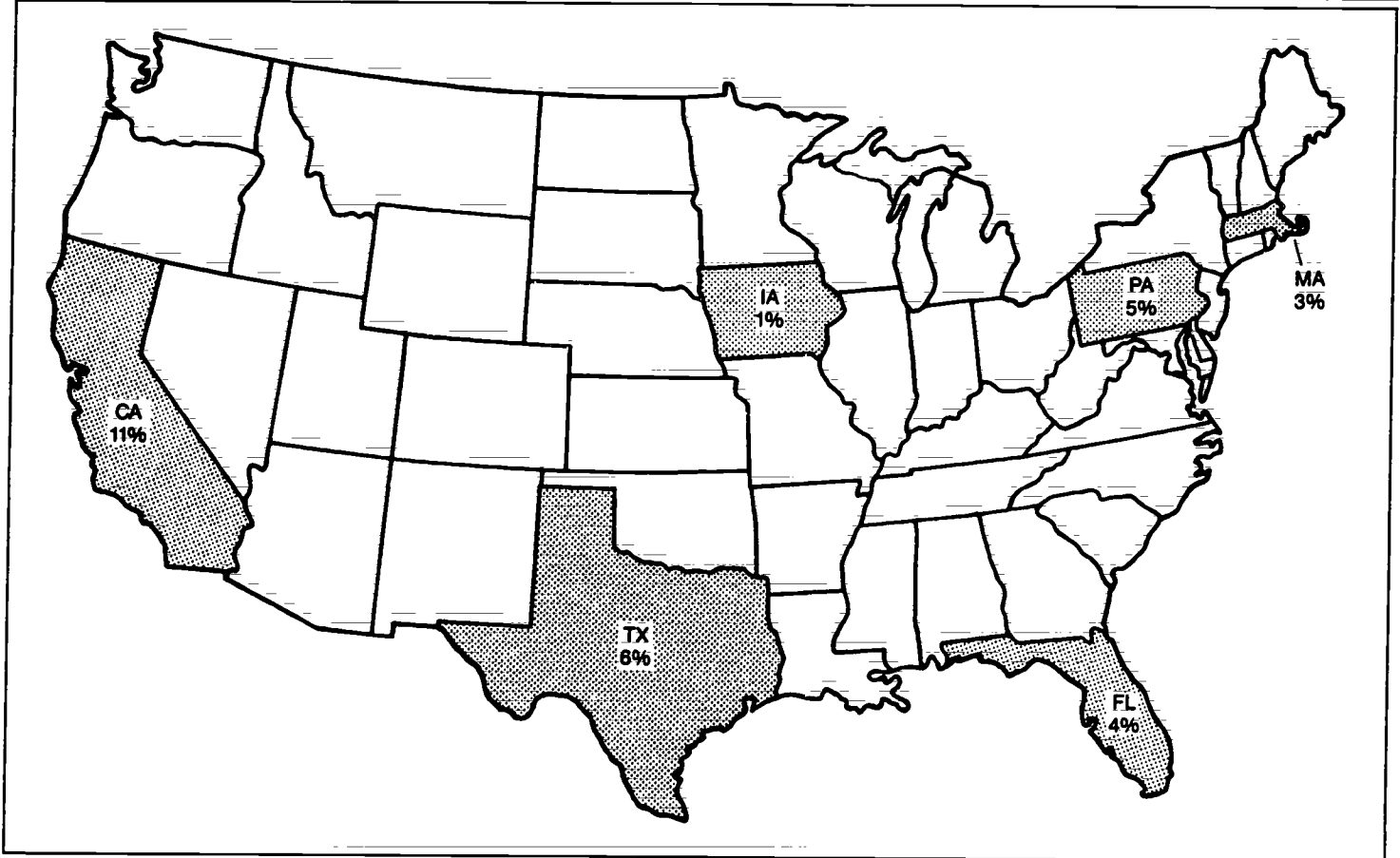
- the impact of past federal EMS efforts,
- the impact of the PHHS block grant on the funding of regional EMS systems created under the 1973 EMS Systems Act,
- the development of state and local EMS roles since block grant implementation,
- the status of local systems in providing timely and appropriate EMS, and
- barriers to further progress and areas where federal actions could help improve service delivery.

Information for this report was obtained from national, state, and local sources involved in emergency medical services. National level sources included interviewing officials in or obtaining data from DOT, HHS, the Federal Emergency Management Agency, the Federal Communications Commission (FCC), the Rural Electrification Administration (REA) in the Department of Agriculture, the National Association of State Emergency Medical Services Directors, the American Trauma Society, the American College of Emergency Physicians, the American College of Surgeons, the American College of Cardiology, the American Medical Association, and the American Heart Association. We also consulted with or obtained information from numerous experts involved in emergency medical services, including the former director of the federal EMS categorical program, the director of the Maryland Institute of Emergency Medical Services Systems, and leading state and local EMS officials, including the chief of the San Diego County EMS system.

Information on state and local roles and practices in EMS was obtained from visits to 6 states and 18 local areas within those states.

As shown in figure 1.1, the six states—California, Florida, Iowa, Massachusetts, Pennsylvania, and Texas—make up about 30 percent of the U.S. population based on 1980 census data and represent various geographical regions. They also contain varying population densities and were among 13 states we had previously included in the 1984 PHHS block grant review, permitting us to compare the most recent state policies with trends we previously observed.

**Figure 1.1: Six States Reviewed, Comprising 30 Percent of the U.S. Population**



Our review at the state level focused on state regulatory and programmatic activities that influence the local delivery of emergency medical services. We examined state laws and regulations involving, for example, the licensing and certification of vehicles, personnel, and medical facilities. We also collected information on state programs that provide direct services, technical assistance, and grants to local EMS systems. Finally, we examined trends in the states' funding and regulatory roles in emergency medical services over the past 5 years to assess the effect of the PHHS block grant, implemented in 1982, on the direction of state activities.

Within the 6 states, 18 local areas were selected for case study to represent a range of population densities and levels of medical resources. As



shown below, they include 3 major urban areas, 3 predominately rural areas, and 12 neighboring urban and rural areas.

### 3 Urban Areas

- Alameda County (Oakland), California.
- Boston, Massachusetts.
- Dade County (Miami), Florida.

### 6 Urban and 6 Contiguous Rural Areas

- Sacramento County and Placer County, California.
- Melbourne and Brevard County, Florida.
- Iowa City and Iowa County, Iowa.
- Harrisburg and Perry County, Pennsylvania.
- San Antonio and Atascosa County, Texas.
- Amarillo and 26 surrounding counties, Texas.

### 3 Rural Areas

- West Central Iowa.
- Western Massachusetts.
- Northeast Pennsylvania.

At each local area, we reviewed their capability to handle each phase of an effective EMS system—access, dispatch, ambulance services, and transport to critical care facilities—throughout the life cycle of a medical emergency. For each phase, we determined whether certain practices exist which research indicates are associated with effective service delivery.

- Access—presence of the commonly recognized emergency telephone number 911.
- Dispatch—central or coordinated ambulance dispatch.
- Ambulance—availability of advanced on-scene medical care.
- Transport—protocols and transfer agreements that assure victims are taken to appropriate medical facilities.

Once the status of the local area's capability was identified, we sought to identify factors responsible for the presence or absence of an effective EMS system. These factors included, for instance, the availability of medical resources, uncoordinated provision of services by local public and private entities, and trends in federal and state funding support and regulatory and programmatic activities over the past several years. Information on the status of local EMS systems and the factors responsible was obtained primarily through interviews with a number of local



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officials in each area as well as an examination of local studies and documents.

Because the critically ill or injured benefit most from an effective EMS system, we focused on two critical patient groups—acute cardiac and major trauma. These groups were selected because (1) most critical emergencies involve these groups; (2) the two groups as a whole represent all ages—most cardiac victims are age 45 or older and most trauma victims are age 44 and younger; and (3) the range of the needed emergency medical services for the two generally encompasses those services required in other critical emergencies.

While the main thrust of our review was clearly to assess the status of the EMS program at the state and local level, we did—as asked by the requesters—identify certain areas where actions by the federal government could help overcome barriers to further state progress. Chapter 5 contains specific recommendations pertaining to such federal action, and chapters 3 and 4 set forth other federal actions that we believe warrant further exploration by the appropriate congressional committees.

Our fieldwork, from October 1985 to March 1986, was conducted in accordance with generally accepted government auditing standards, except that we did not obtain official agency comments at the direction of the requesters. We did, however, discuss the report with relevant agency officials and have incorporated their comments in the report

# States Use Block Grant Funds to Build on Federal Categorical Initiatives

The federal highway safety and EMS systems categorical programs of the 1960's and 1970's were instrumental in increasing the awareness of state and local governments, service providers, and the public about the need to upgrade EMS capabilities. Although EMS funding was initially reduced in the states under the PHHS block grant, they are now assuming a stronger funding and regulatory role as local governments and other service providers look more to states, rather than the federal government, for guidance and funding. Using the flexibility under the block grant, states are providing ongoing support for most EMS regions established under the prior categorical program. Better coordination of federal funding at the state level, however, could assist in furthering EMS system development.

## Progress and Problems in Federal EMS System Development Efforts

Progress was made in EMS under federal leadership. With federal aid provided by highway safety and EMS systems programs, along with several other programs indirectly related to EMS, many communities throughout the nation upgraded their EMS resources. The federal programs increased the awareness of state and local governments, service providers, and the public of the need to systematically deliver EMS. As a result, better equipped ambulances were purchased, communications capabilities were improved, hospital emergency departments and other treatment centers obtained equipment to better diagnose and treat emergency patients, and more people were better trained to provide emergency medical care.

All of the 18 local areas we visited used federal categorical funds to establish and expand local EMS systems. For instance, state and local officials reported that:

- The current EMS system in Alameda County, California, was started with EMS Systems Act grant funds in 1974. The funds were used to develop standardized exams for paramedics, put radios in all the ambulances, and set up a basic communications system, which was later improved with additional funds.
- Boston developed the basis of its EMS system in the late 1970's with federal EMS systems categorical funds. Boston used its money to purchase its central medical emergency dispatch equipment and designate three trauma centers.
- The Emergency Health Services Federation EMS System, including Harrisburg, Pennsylvania, and eight counties, used federal categorical funds to provide education, training, and communications and ambulance equipment.

Certain problems, however, hampered EMS system development during the 1970's. The EMS categorical program was very structured and subject to considerable federal control. HHS regulations set forth extensive requirements to qualify for funding. For example, regional systems were required to maintain 15 system components, ranging from system-wide communications to offering public education and developing disaster plans. Moreover, each region was required to obtain a future funding commitment from its local governments as a condition for receiving the grants.

As we reported in 1976, establishing regional EMS systems under those conditions proved to be an ambitious undertaking, and many difficulties were encountered. Attempting to superimpose regional entities over cities, counties, and private service providers prompted jurisdictional disputes and coordination problems. Moreover, in 1979 we reported that when federal funding ceased, many local governments were unable or unwilling to sustain the system.<sup>1</sup>

Under the categorical program, states had limited involvement in program administration. In some states, funds were provided directly from HHS, bypassing the state government. In other cases, grants were made to the state, which in turn awarded funds to regional systems. The ability of those states to determine how best to support local systems, however, was constrained by the same federal requirements that governed the directly funded grantees.

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## Stronger State Roles Emerge Under the Block Grant

In 1981, the federal government gave states discretion to determine needs and set funding priorities for seven categorical programs consolidated into the PHHS block grant. In addition to EMS, states could choose to fund six other programs under the block grant:

- health incentive,
- urban rat control,
- hypertension,
- fluoridation,
- health education risk reduction, and
- home health care.

Rape crisis was also included as a mandated service.

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<sup>1</sup>Progress, But Problems in Developing Emergency Medical Services System (HRD-76-150, July 13, 1976); Letter report to the Chairman, Subcommittee on Health and Scientific Research, Senate Committee on Labor and Human Resources (HRD-79-69, Apr. 12, 1979).

During congressional hearings on the passage of the block grant legislation, concerns were raised that states would make less funding available for EMS, resulting in reduced service levels. Although initial state expenditures were reduced from levels sustained under the categorical program, most states have reversed that trend and have assumed stronger regulatory and financial assistance roles.

### EMS Receives Lower Priority in Initial Block Grant Years

From 1981 to 1983, total expenditures for EMS fell by 34 percent in the six states we reviewed, as shown in table 2.1. These six states reduced funding below levels received in 1981 under the last year of the categorical program.

**Table 2.1: Total Federal and State Expenditures for EMS**

Dollars in thousands

States	1981	1983	1985	Percent change in expenditures	
				1981/1983	1983/1985
California	\$6,102	\$3,674	\$5,601	-40	+52
Florida <sup>a</sup>	976	736	799	-25	+9
Iowa	773	416	445	-46	+7
Massachusetts	1,549	1,268	1,709	-18	+35
Pennsylvania <sup>a</sup>	5,218	3,111	3,385	-40	+9
Texas	3,266	2,536	3,092	-22	+22
<b>Total</b>	<b>\$17,884</b>	<b>\$11,741</b>	<b>\$15,031</b>	<b>-34</b>	<b>+28</b>

<sup>a</sup>State has recently passed special revenue legislation predicted to significantly increase EMS funding.

The 34-percent drop in overall EMS funding is explained by decreases in both PHHS block grant funding and DOT funding devoted to EMS. First, EMS funding was reduced from \$5.6 million in 1981 categorical to \$4.9 million in 1983 block grant funds. State EMS officials attributed this decline to a need to fund higher priority areas since block grant funding levels were 14.5 percent below 1981 categorical funding levels, although continuing categorical outlays carried over from prior year awards initially offset much of this cut. In our 1984 report on the first 2 years' experience under the PHHS block grant, we reported that states assigned lower priority to programs, such as EMS, where they had less involvement during the categorical program years.<sup>2</sup>

<sup>2</sup>States Use Added Flexibility Offered by the Preventive Health and Health Services Block Grant (GAO/HRD-84-41, May 8, 1984).

Second, these states reduced DOT highway safety funds allocated for EMS from \$7.3 million in 1981 to \$1.2 million in 1983, reflecting a national decline in the use of these funds for EMS. DOT officials explained this decline was principally due to several factors, including (1) a 46-percent drop in total funding for the entire program; (2) an increase from 17 to 24 percent in the funds states must set aside for other congressionally mandated purposes, such as enforcement of the 55-mile-per-hour speed limit; and (3) restrictions imposed administratively during this period on the types of EMS projects eligible for funding.

### States Assume Stronger EMS Leadership Over Time

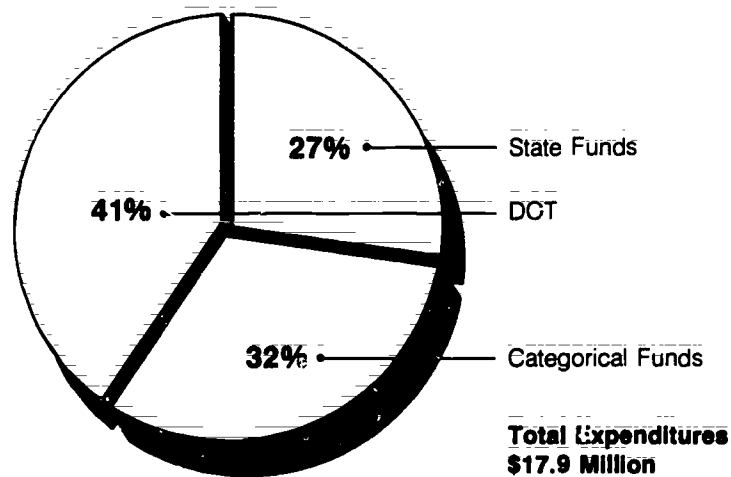
This trend has been reversed between 1983 and 1985. Although total funding has not returned to the 1981 level, table 2.1 shows overall funding for the six states increased by 28 percent from 1983 to 1985. While all six states' funding was reduced from 1981 to 1983, EMS funding in these states for 1985 increased from 1983 levels.

Increases in state funds were primarily responsible for this funding increase. State funds increased from \$5.6 million to \$7.5 million over this period and accounted for 58 percent of the increase.<sup>3</sup> The six states slightly increased their use of block grant funds from \$4.9 million to \$5.1 million. DOT funds allocated for EMS also increased from \$1.2 million to \$2.4 million over this 2-year period.

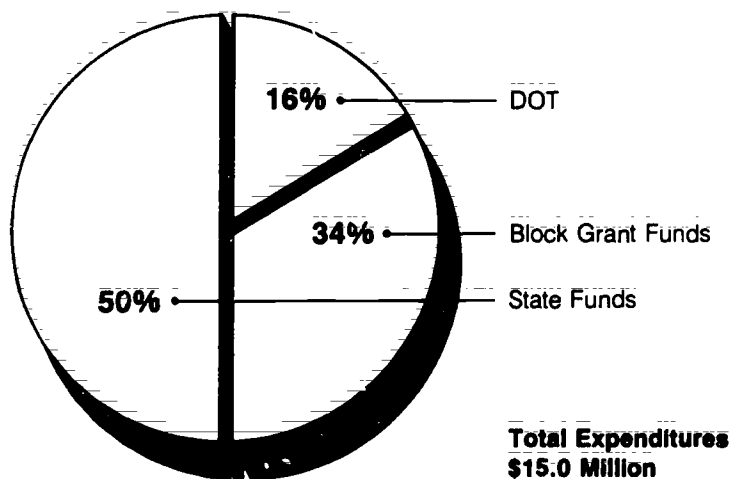
Over the entire 5-year period, state revenues became the principal funding source for EMS. As shown in figures 2.1 and 2.2, the proportion of total EMS funding derived from state revenues increased from 27 to 50 percent from 1981 to 1985. While the share contributed by federal EMS categorical and PHHS block grant funds remained about the same, the proportion of funds from DOT declined from 41 to 16 percent over the 5-year period. Although this decline mirrors the national trend as explained above, the proportion of total EMS expenditures contributed by DOT funds in our six states may be higher than the national average because two of our states—California and Pennsylvania—account for more than one-fourth of the total DOT funds spent nationally on EMS.

<sup>3</sup>Florida recently passed legislation placing a surcharge on moving violations, which is expected to generate an additional \$10 million annually for EMS. Pennsylvania also passed revenue-generating legislation similar to Florida's.

**Figure 2.1: 1981 EMS Funding Sources for Six States**



**Figure 2.2: 1985 EMS Funding Sources for Six States**



The increased funding reflects significant expansion of state EMS roles under the block grant. From 1981 to 1985, all the states except Iowa have assumed new regulatory and other programmatic responsibilities by either passing new legislation or developing new regulations to expand the states' authority in the EMS area. For example, California state EMS officials said that anticipating the block grant, the state passed legislation in 1980, creating an independent Emergency Medical Services Authority, which develops state regulations for personnel, training,

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vehicles, and equipment. Another example is Texas, where state officials said that before the block grant, the Texas EMS office acted only as a pass-through agency for categorical grant funds and had no regulatory authority. In 1983, the state enacted legislation giving the office both regulatory and expanded programmatic authority.

The states exercised their new regulatory authority in such areas as emergency medical technician training, personnel licensing and certification, and/or vehicle and equipment specifications and inspections. For instance, states reported that:

- Between 1982 and 1985, California implemented minimum standards and regulations for certifying emergency medical technicians (EMTs) and began inspecting air and ground EMS vehicles.
- In 1982, Massachusetts began reviewing and approving the EMT certification exams and training courses, and inspecting and licensing ambulances.
- In 1982, Florida began licensing air and ground EMS vehicles biennially and regulating hospitals desiring to refer to themselves as trauma centers.

In addition to these regulatory activities, five of the six states created new programs to fund and otherwise assist local EMS systems train personnel, buy equipment, or plan for further system improvement. For example, California is funding a region to plan and establish a trauma registry—a systematic collection of information on trauma resources and cases among the area's hospitals.

Accompanying stronger state roles is an increasing involvement of local government and interest groups in program decisions. In our 1984 report, we noted that local citizens had increased their involvement with state decision making as a result of the block grant. The block grant requires states to hold legislative public hearings and prepare and make public reports on their intended and actual uses of block grant funds.

In addition to these federally mandated sources of local input, four of the the six states established new advisory organizations, which should enhance communications between local providers and the state. Within the past 5 years, Florida, Iowa, Pennsylvania, and Texas created, under authority of new legislation, state advisory councils to the states' EMS office. Their functions include reviewing and commenting on state EMS policy, regulations, standards, and other aspects of state programs. Members include physicians, nurses, EMTs, hospital administrators,



ambulance service providers, and representatives of the various state agencies involved in emergency medical services.

### States Continue Support for Regional Systems Under Block Grant

Five of the six states have chosen to channel funds to most of the regions created by the categorical EMS program. Three of the five delegate additional regulatory responsibilities to these regions. They have used their flexibility under the block grant to both broaden the number of regions funded and to expand the scope of state and regional activities.

According to a 1985 state survey conducted by the National Association of State EMS Directors, 219 (or 76 percent) of 287 regions were being funded in 37 of the 50 states and territories that responded to the survey and for which comparable data were provided. Of these 219 regions, 45 had completed the 5-year categorical funding cycle and would not have been eligible to receive further federal assistance if the categorical program had been continued.

States relied on a mix of state, local and block grant funds to support the regions, according to the survey. Two states continued funding their regions using block grant funds only, 12 were using state and/or local funds only, and 23 were using a combination of block grant, state, and local funds.

All of the six states in our review were funding regional EMS systems, except Florida, which was not using block grant funds for EMS. Unlike the categorical program which funded regions on a competitive basis, these states generally funded most of their regions. The five states were using their block grant flexibility to continue funding 7 of their 18 regions that would no longer have been eligible for categorical assistance. Thus, in some cases, block grant funds are sustaining regions that may otherwise have been unable to obtain funding once their 5 years of categorical grants were completed. For instance, the block grant permitted Massachusetts to support all six EMS regions with block grant funds, including three regions that had completed their 5-year categorical funding cycle. In the absence of block grant funds, those regions no longer eligible for categorical funds may have faced an uphill struggle to obtain local funds to continue operation.

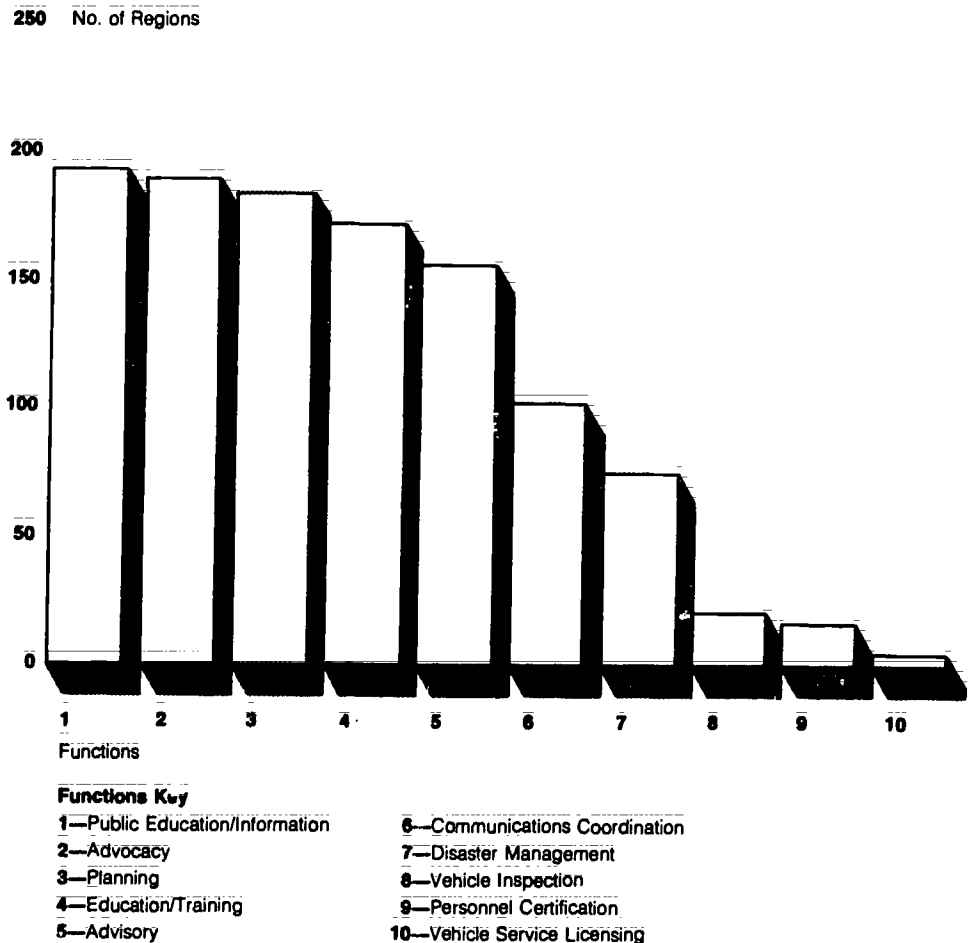
In extending assistance to regions, states reported that they also relaxed requirements for regional funding. While the federal program required regions to maintain a 15-component comprehensive regional EMS system,



officials said that states gave the regions more flexibility to address local needs. For instance, a state official said that Massachusetts intends to fund the regions indefinitely and is permitting each to concentrate its efforts on the perceived needs of the area. The western Massachusetts region has funded personnel training, while the Boston region has funded a burn incidence study.

Although states have given the regions more flexibility, their functions across the country are similar. A 1985 survey (see fig. 2.3) reported that most of the regional functions include public education/information, planning, advocacy, education/training, advisory, and communications coordination activities involving the various service providers while few are involved in regulating or controlling service delivery.

**Figure 2.3: Regional EMS Council Functions**



Source: 1985 National Association of State Emergency Medical Services Directors Survey.

## Certain Limited Federal Actions Could Assist States

Although states have assumed leadership roles in EMS, federal programs continue to influence state policies. State officials believe the PHS block grant supports their efforts by giving them the flexibility to tailor resources to address state EMS problems. However, the lack of state-level coordination in states' use of highway safety funds for EMS purposes may limit states' abilities to assure that these funds are used to support the highest state EMS priorities. State officials also told us that the federal government should support a national EMS clearinghouse activity to provide needed information to states in developing new programs.

## Coordinating Highway Safety Funds for EMS at State Level

Highway safety and EMS programs in the six states are administered by separate agencies but are often not well coordinated, according to state and local officials. While the state EMS office is typically part of the state's health department, highway safety funds go through a separate agency usually located in the state's transportation department. That agency makes expenditure decisions on a variety of highway safety programs that could include EMS.

DOT recognizes a coordination problem between state transportation departments and EMS offices. In a 1983 memorandum to the regional offices, the associate administrator for traffic safety programs said that relations between state EMS offices and the governor's highway safety representatives in some cases were either nonexistent, erratic, or outright antagonistic. The memorandum further stated that a special effort to promote closer and regular cooperation between these key state offices would be desirable in view of the growing importance and expertise of state EMS offices. The memorandum, accordingly, asked the DOT federal regions to promote and support periodic meetings and coordination between these state offices.

At the time of our fieldwork in the fall of 1985, however, highway safety offices in four of the six states we visited were still not coordinating with the EMS offices when deciding to use DOT funds for EMS activities, according to both EMS and highway safety officials in those states. For example, in California, \$1.3 million of federal highway safety funds were spent on EMS in 1985. The state EMS office director said that, since his office was not involved in such decisions, he could not judge whether federal highway safety fund expenditures were effective in meeting state plans or needs in the emergency medical services area.

Federal highway safety expenditures in Florida are also not coordinated with the EMS office. Both the state EMS director and a state highway safety official told us that, without input from the EMS office, highway safety funds were recently awarded to Dade County to develop a trauma registry. Since the EMS office regulates trauma centers on a statewide basis, state officials believe that trauma care data should be collected and maintained on a uniform basis across all counties. Accordingly, EMS officials believe that statewide standards for trauma care data should be developed before individual counties are funded to establish trauma registries.

## Need for National Information Clearinghouse

State officials said that a nationally focused information clearinghouse could aid state and local efforts to develop new policies and practices for emergency medical services. Since the advent of the 1981 block grant, the federal role in collecting and disseminating information on the success and problems experienced by state and local agencies in delivering EMS has been limited. As a result, states are individually pursuing initiatives to develop new policies or programs with varied and limited knowledge of the experiences of their counterparts or of national studies in the area, according to an official with the national organization representing state EMS directors.

State officials said that they would benefit from information on regulatory and programmatic initiatives undertaken by other state or local systems, new EMS technologies, and research assessing the most effective service delivery methods. States are particularly interested in information on regulating air ambulance services, establishing trauma systems, facilitating reciprocity between states for ambulance personnel, and generating new revenues for EMS.

According to state officials, an appropriate role for the federal government would be the sponsorship of a national clearinghouse activity that could give information to states. Such a clearinghouse could give federal officials better information to monitor progress in the EMS area.

During the period of our fieldwork, HHS and DOT funded the National Association of State EMS Directors to collect and disseminate information on state EMS activities. Although federal funding for this effort has expired, the association is continuing to support an EMS clearinghouse to disseminate information to state agencies. Also, DOT is sponsoring an effort with state and local EMS providers to assess and update national voluntary standards for EMS in such areas as vehicles and personnel.

## Conclusions

The block grant has worked well in engaging the states' resources to support EMS systems development. Early federal categorical programs heightened the awareness of and interest in improving the delivery of emergency medical care across the country. Bolstered by the more flexible funding emanating from the conversion from federal categorical support to the block grant, states assumed a greater role over time in financing and regulating EMS systems. Although initially cutting funding below prior categorical levels, most of the six states are reversing this trend and increasing their own EMS funding support. As EMS providers and the medical community increasingly look to states rather than the

federal government for leadership, states increasingly have an expanded agenda of regulatory and programmatic initiatives. States have utilized the EMS regions as partners in these efforts, taking advantage of their flexibility under the block grant to provide long-term funding support for the regions.

While the block grant has conferred the primary EMS leadership role on the states, better coordination is needed at the state level when federal DOT funds are used for EMS purposes. Although DOT has sought improved coordination between state transportation and EMS offices since 1983, our work shows that state EMS offices are still often not consulted when decisions are made to use highway safety funds for EMS activities.

The primary responsibility for improving coordination rests with the appropriate state officials. Continued DOT encouragement of state level coordination, however, could promote more effective state programs.

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Having examined the development of EMS and changes in federal, state, and local roles since the mid-1960's, in the following three chapters we present current EMS system issues in delivering services at the local level. Potential state and federal actions to address these issues are identified.

# Access and Dispatch: A Systematic, Area-Wide Approach Eludes Many Areas

The expeditious response of emergency medical services begins with an effective system of public access and efficient ambulance dispatch. Studies show that this can best be provided by a single coordinated system that accesses all ambulance service providers in the area through the commonly known 911 emergency telephone number. Nonetheless, many areas find this difficult to accomplish, due to fragmentation among both service providers and local governments within an area, as well as the high initial cost of installing central telephone reception and dispatch equipment. State mandates requiring 911 coverage, coupled with state provision of a local funding mechanism, have helped some areas overcome these barriers, but only six states nationwide have taken both these actions. If the Congress decides that promotion of 911 coverage is in the federal interest, a federal loan program geared to rural areas could be considered to stimulate greater 911 coverage by defraying local governments' initial start-up costs.

## Single Number Access, Particularly 911, Expedites Response

The telephone is usually the means by which an EMS system is notified of a medical emergency. A single area-wide telephone number, particularly the commonly known 911 emergency number, significantly hastens public access, thereby reducing response times. A 911 system has two distinct advantages. First, callers need only remember the commonly recognized three-digit access number. Second, an area-wide 911 system automatically routes the call to the most appropriate ambulance service or other emergency responder.

Emergency medical services are provided throughout the United States by a variety of public and private entities, such as cities, counties, fire departments, ambulance companies, and hospitals. Callers for EMS in areas without a universal emergency number such as 911 often will not know which service covers their location. Results from an earlier survey on local areas without 911 illustrate the problem. The study revealed that 24 percent of emergency callers in Santa Clara County, California, initially called the wrong agency because they were uncertain whether they were in the county or the city of San Jose. Jurisdictional boundaries confused the responding agencies as well, since there were reported instances where neither the county nor the city ambulance service would respond to calls from a particular street block. In the case of Orange County, Florida, 40 percent of the callers surveyed reached the wrong number. Much of the problem was attributed to the fact some callers were tourists and others traveling through the area.

Other studies have shown the advantages of 911. A Minneapolis/St. Paul study completed in early 1983 reported that before 911 there were over 100 seven-digit emergency medical service numbers in the metropolitan area. The study revealed that the number of callers waiting longer than a minute before reaching the correct contact dropped from 37 to 18 percent after the implementation of 911. Further, before 911, only 40 percent got through to the right number on the first try. After 911, 74 percent got through on their first attempt.

Figure 3.1: Central Communications for  
911 and Ambulance Dispatch



### Availability of 911 Varies Significantly

Nationwide, 911 coverage has grown. A Stanford Research Institute study reported that in 1976, 27 percent of the population had 911 coverage. Although no statistics have been kept since 1978, the president of the National Emergency Number Association estimates that about 40 percent of the population has access to 911.

Nevertheless, coverage of 911 varies significantly among the urban and rural areas we visited, with urban areas generally having more 911 coverage. As shown in table 3.1, among the 18 areas we visited, 6 of the 9 urban areas have 100 percent of the population covered by 911, while only 2 of the 9 rural areas have complete coverage.



**Table 3.1: 911 Coverage Among 18  
Local Areas**

Coverage	Urban	Rural	Total
100 percent	6	2	8
50-99 percent	2	1	3
1-49 percent	0	2	2
None	1	4	5

In areas not covered by 911, various access systems exist. For example, the Amarillo, Texas, EMS region is covered by a single, area-wide "800" EMS access number, in addition to local seven-digit EMS numbers in cities throughout the region. Another system in Perry County, Pennsylvania, has five seven-digit numbers, whose geographic coverage usually corresponds to local jurisdictional boundaries. In the southeast Iowa region, there are about 75 multiple-access numbers, including ambulance provider, local police, and fire department numbers. As demonstrated in the Minneapolis/St. Paul study, callers in this area may experience delays identifying and calling the appropriate number. (See p. 31.)

Partial 911 coverage in an area promotes confusion among those not covered. For example, a survey showed that in the Boston region, 71 percent of those with 911 were able to remember the correct number, while only 21 percent of those without 911 could do so. In Wellesley, a city in the Boston region without 911, an official said that residents often call 911 instead of the seven-digit number and reach the 911 operators of surrounding municipalities. The official added that either those calls require time-consuming transfers or callers are referred to the seven-digit number covering their location. In either case, time could be lost.

### Fragmentation Among Local Service Providers and Start-Up Costs Inhibit Implementation of 911

Establishing a single area-wide emergency telephone access number is difficult for many areas. The most common barriers cited by the 10 areas we visited lacking complete 911 coverage were start-up and operating costs of a 911 system and ambulance and telephone service fragmentation.

Officials in the seven rural areas and the three urban areas without complete 911 coverage cited the cost of installing and operating a 911 system as an obstacle. As shown in table 3.2, officials in six of these areas believe that the initial start-up costs constitute a barrier, while those in three areas cited the continued operating costs as a barrier. A telephone company EMS expert said that the cost of installing basic 911



is about \$250,000. Studies show that operating and installation costs vary widely depending on geographic, demographic, and technical factors; however, per capita costs are higher in rural areas because they have fewer people to finance fixed installation and operating costs.

**Table 3.2: Local EMS Officials' Opinions on Inability to Establish Area-Wide 911<sup>a</sup>**

Reasons for incomplete 911 coverage	Area		Total
	Urban	Rural	
<b>Total without complete 911 coverage</b>	<b>3</b>	<b>7</b>	<b>10</b>
High start-up costs	1	5	6
Public and private ambulance service fragmentation	2	2	4
High operating costs	0	3	3
Fragmented telephone services	0	3	3
Difficult to convince public of need	0	2	2
Alternate single access number	0	1	1

<sup>a</sup>The totals in each column may exceed the number of areas contacted because more than one reason was cited by officials in several areas.

Officials in the areas citing costs as a barrier told us that the availability of general revenues was limited. While initial start-up costs were too great to be financed out of general revenues, they are too small to be supported by a bond issue.

Fragmentation among ambulance services was cited by 4 of the 10 areas as a barrier to complete 911 coverage. A Stanford Research Institute study reported that in an area with several ambulance services, local governments and ambulance services themselves are sometimes reluctant or unwilling to relinquish control of emergency calls to a central telephone reception point. Local officials we visited said that the ambulance providers are concerned about delaying or mishandling calls and about losing calls to other providers. In the Boston region, for example, a local EMS official said that police and fire departments in communities without 911 have been unwilling to consolidate or relinquish control of direct calls. Similarly, in west central Iowa, officials indicate that local areas are reluctant to give up their own dispatching activities; the telephone company will not install 911 until such political considerations are addressed.

Telephone service fragmentation is a problem in three of the seven rural areas we visited where more than one telephone company provides service. For example, local officials in the west central Iowa area said that the technical difficulties involved in implementing a single phone service

across the 27 telephone companies serving the area would hamper implementation of 911 throughout the area.

### State Leadership Can Help Overcome Local Fragmentation

State leadership can help overcome some of the barriers to implementing 911. Nationwide, only 6 states are known to require 911, and 26 are known to have authorized a special funding mechanism for local systems to pay for its cost. The states we visited that have legislation mandating 911 in local areas and provide a special funding mechanism, such as a telephone bill surcharge, have greater 911 coverage. Of our six states, California and Florida require 911 before the 1990's and authorize local governments to assess a surcharge to pay for its costs. Both states have over 70 percent coverage. The six local areas visited in California and Florida have 100 percent coverage. The Alameda County, California, EMS system administrator, for example, said that the state law requiring 911 and providing the county authority to impose telephone surcharges was a major reason for the county's development of a 911 system.

The other four states visited—Iowa, Massachusetts, Pennsylvania, and Texas—lack either a 911 mandate or a funding provision and have less than 50 percent of the population covered by 911. Seven of the 12 local areas visited in these four states have 20 percent or less 911 coverage. In five of these local areas, officials said that state-legislated mandates and funding provisions would increase the likelihood of 911 implementation.

### Existing Federal Loan Program Facilitates 911 Coverage in Rural Areas

In addition to supporting state and local EMS efforts through the block grant and highway safety programs, the federal government has indirectly supported 911 implementation through the Department of Agriculture's Rural Electrification Administration loan program.

Federal low-interest loans to telephone companies for improved switching equipment have helped remove technical barriers to 911 in rural areas, according to REA officials. They added that about 1,000 of the nation's 1,400 telephone companies have used the REA program to acquire the technical capability and modern equipment equivalent to that in urban areas. Upgraded equipment purchased with REA loan funds, particularly installation of digital switching equipment, has facilitated implementation of 911 systems.

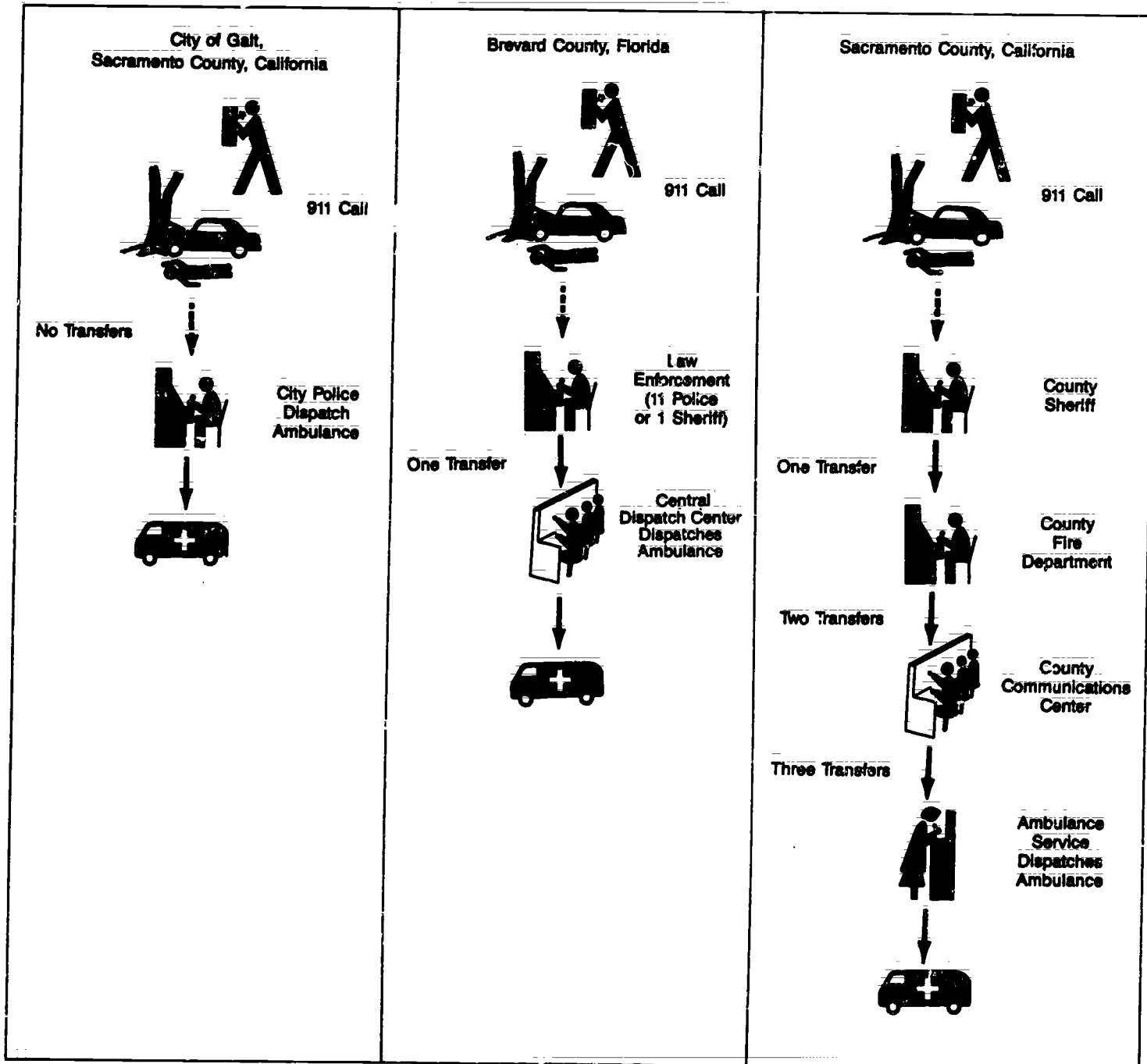
However, REA is not authorized by its legislation to make loans to local governments to cover the costs of establishing 911 systems. Technical studies show that such costs include purchase or lease of terminal equipment for emergency communications centers, computerized routing of incoming calls, provision of dedicated trunk lines from company central offices to emergency communications centers to assure uninterrupted access, as well as staff and facility costs. Four of the 10 areas we visited without full coverage of 911 said that a federal loan program offering financing to defray 911 start-up costs would increase the likelihood of local implementation of 911 systems. A loan program would permit them to finance the initial start-up costs over several years rather than in a single lump sum payment.

### Local Dispatch Systems Vary in Response Efficiency

While the availability of 911 promotes quicker public access to the EMS system, an efficient process for dispatching EMS resources once the initial call has been made also promotes a timely and appropriate response. An efficient local dispatch system quickly transfers incoming calls to appropriate ambulance service providers. To assure an appropriate response, the dispatch system must also have the capacity to know of the availability of ambulance services. Dispatching practices varied among the 18 areas visited.

The number of times a call is transferred before an ambulance is dispatched affects response time. In the 18 areas visited, the number of transfers ranged from none to three, reflecting in part the extent of fragmentation among local emergency service providers. The differing dispatch practices in three of the local areas visited are illustrated in figure 3.2.

Figure 3.2: Transfer of Calls in Three Local Areas\*



\*Based on information provided by local EMS officials in these areas.

As shown in figure 3.2, in the City of Galt in Sacramento County, California, no transfers are made; 911 calls go directly to city police, who dispatch vehicles. On the other hand, in Sacramento County itself, calls are transferred three times: the county sheriff receives 911 calls and transfers them to the county fire department, which transfers them to the county communications center, which contacts one of two ambulance services, which dispatches the vehicles. In Brevard County, Florida, calls are transferred once from primary receiving points for incoming 911 calls (police and sheriff) to a central dispatch center, which monitors availability of the two ambulance services in the county and dispatches the most appropriate ambulance.

Response time is also influenced by the information obtained by the dispatcher. All 18 areas collect location information from emergency callers; however, 4 areas use a special feature called "enhanced" 911. Enhanced 911 automatically displays the address and phone number from which the call was made on a computer screen when the call comes in. This feature speeds response time and lessens the chance of error. Enhanced 911 has been credited with saving lives when children or others unable to provide this information have called for help. However, the enhanced features can quadruple the cost of 911. A New England telephone company official told us the installation cost of enhanced 911 is about \$1 million as compared to a typical \$250,000 installation cost for the basic 911 system.

Ambulance response time is also affected by the dispatchers' knowledge of ambulance service availability in the area. To dispatch the appropriate ambulance, dispatchers must know which of their units are available to respond as well as what backup services are available in surrounding areas in case their own units are out on a call. Dispatchers in all but 4 of the 18 areas knew the availability of their units and had backup arrangements with neighboring ambulance services, according to local officials. For example, in Massachusetts, the state requires ambulance services to have backup or reciprocity agreements with other ambulance services. Therefore, according to EMS officials, the ambulance companies not only knew the availability of their own vehicles but had access to other vehicles when needed. However, the EMS director in northeast Pennsylvania said none of the 23 ambulance services had backup agreements.

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## Conclusions

In areas with 911, the public can obtain the quickest access to EMS. Although nationwide coverage has increased in the past 10 years, it is estimated that more than 50 percent of the population, primarily in rural areas, still live in areas without 911. Initial start-up and operating costs, as well as ambulance and telephone service fragmentation, have hampered the development of coverage, particularly in rural areas.

More active state involvement could promote broader local 911 coverage. State laws mandating coverage and providing a funding mechanism have provided impetus and resolved cost problems for local areas, but only 6 of the 50 states have taken both these actions.

While the federal REA program has helped rural telephone systems upgrade their technical capability to permit 911 installation, local governments in rural areas have often not capitalized on these technical improvements partly due to the high start-up costs involved with the installation of 911 systems. Although states are in the best position to support wider 911 coverage, federal support could also help by defraying the initial start-up costs. If such support were provided through loans, it could be paid back over time either through surcharges on telephone bills or through state or local tax revenue. Furthermore, as discussed in chapter 4, modifying the PHHS block grant equipment purchase restriction to permit the purchase of communication equipment could also provide another source of funds to stimulate the growth of 911.

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## Matters for Consideration by the Congress

If the Congress decides that promotion of 911 is a desirable national goal, one option that could be explored would be to modify legislation authorizing the REA loan program to permit available loan funds to be used by local governments to support local 911 implementation in rural areas along with existing authorized purposes.

# EMS Systems Seeking Greater Advanced Life Support Coverage

The critically ill and injured require sophisticated care at the scene of the medical emergency. For these cases, the greater the capability of an ambulance service, the less likely avoidable deaths and disability will occur. Most urban areas have ambulance services that provide advanced life support (ALS) care suitable for critically ill cardiac and trauma cases. While most rural ambulance services offer less advanced care than urban areas, some are striving to provide ALS care to the critically ill and injured through cooperative ventures with other service providers. State and local governments have developed standards covering the quality of care and, therefore, have increased the local medical profession's acceptance and support of advanced prehospital care. Recent federal actions to increase radio frequencies available to public safety users—including EMS—could help improve delivery of advanced care. Increased local upgrading of outmoded communication equipment might occur if the current restriction on purchase of new equipment with PHHS block grant funds were lifted.

## ALS Offers the Greatest Benefit to Critically Ill or Injured Persons

On-scene emergency care is generally divided into two levels of care—basic life support (BLS) and ALS. BLS is provided by emergency medical technicians trained in noninvasive treatment methods, such as administering cardiopulmonary resuscitation, dressing wounds, and administering oxygen. ALS is a more sophisticated level of treatment delivered by paramedics trained in invasive medical techniques, such as administering drugs intravenously, defibrillating cardiac arrest victims with electric shock, and clearing airways by inserting a breathing tube. Generally, paramedics deliver ALS treatment under medical direction, both through radio contact with a physician and by following written medical treatment instructions or protocols. ALS also includes the specialized equipment that must be on board the ALS vehicle, such as defibrillators, endotracheal tubes, drugs, and intravenous equipment.



**Figure 4.1: ALS Air Ambulance Delivers Victim to Trauma Center**



According to EMS experts, BLS care is adequate for most medical emergencies. However, ALS care is preferable for the more critically ill or injured, such as cardiac and trauma patients. Results of several studies show that patients who receive ALS care have a higher survival rate than those receiving only BLS. For example, a study conducted by Boston University researchers shows that the chance of survival in cardiac emergencies increases by up to 9 percent when ALS services are provided.<sup>1</sup>

### **BLS Widely Available but Advanced Care Varies**

BLS ambulance services were generally available in the six states and all 18 local areas we visited. Five of the six states require ambulance services to provide BLS. Iowa does not, but many of the local governments in the state require BLS, according to state EMS officials.

ALS services are generally available in urban areas, but are less prevalent in the rural areas.<sup>2</sup> As shown in table 4.1, ALS was available in all

<sup>1</sup>Pamela A. Sytkowski and others, "Testing a Model That Evaluates Options for Rural Emergency Medical Service Development," *Medical Care*, March 1984, vol. 22, no. 3, pp. 202-215.

<sup>2</sup>We defined ALS availability and coverage as the percentage of the population in areas with response time goals or actual response time within the standard response time from dispatch to scene arrival of 10 minutes in an urban area and 30 minutes in a rural area.



nine urban areas visited. The entire population is covered by ALS services in six of the urban areas, and more than 50 percent is covered in the other three. However, ALS was not as frequently available in rural areas. Excluding the rural areas surrounding Amarillo, only one of eight rural areas has 100 percent coverage of ALS, while four had less than 50 percent coverage.

**Table 4.1: ALS Coverage Among 18  
 Local Areas<sup>a</sup>**

Percent of population covered by ALS	Urban	Rural	Total
100	6	1	7
50-99	3	3	6
1-49	0	2	2
None	0	2	2
<b>Total</b>	<b>9</b>	<b>8<sup>b</sup></b>	<b>17</b>

<sup>a</sup>Information provided by local EMS officials in the 18 local areas visited.

<sup>b</sup>The rural area surrounding Amarillo has more than 50 percent of the population covered by ALS services, but no time response goals are established, nor could estimates of average response time be provided.

Local EMS officials in rural areas with less than 100 percent coverage said that the caseload of critically ill or injured victims is too small to justify the expense of ALS. For example, one study showed the cost to staff and maintain an ALS unit is more than double the cost of a BLS unit. Moreover, maintaining paramedic skills is difficult with low caseloads. EMS officials in west central Iowa; Atascosa County, Texas; and north-east Pennsylvania said the number of cases in the rural areas was not sufficient for skill retention.

Some EMS systems in rural areas are using innovative approaches to provide ALS. For example, an EMS official in Holyoke, Massachusetts, said that when ALS is needed, the private BLS ambulance service contacts the local hospital, which dispatches two emergency room paramedics trained in ALS who treat the patient at the scene and, if needed, during transport to the hospital. According to the official, this approach increases cost effectiveness by providing ALS only when needed and overcomes the problem of skill retention in low caseload areas by using hospital-based staff. In the outlying rural areas surrounding Sacramento, California, arrangements exist for EMS to be provided by an ALS-equipped helicopter, which transports victims to the urban trauma center.

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## State and Local Standards Enhance Quality and Availability of ALS

Establishing and enforcing standards is critical to delivering quality prehospital care and to advancing the sophistication of such care. Unless the medical community is confident that paramedics are adequately trained and equipped, their willingness to permit paramedics to provide advanced treatment is unlikely.

All six states visited have established standards for emergency medical personnel, vehicles, and equipment that parallel national standards. Training programs based on national curriculum have been established in all six states, and EMTs and paramedics are periodically certified and licensed. Ground ambulances and the medical equipment carried on the vehicles are also regulated through licensure and inspection. Additionally, four of the six states—Florida, Iowa, Massachusetts, and Texas—regulate air ambulance services.

Medical control over field care through ambulance-hospital communications and treatment protocols also enhances the quality of care. Local EMS officials in the 16 areas we visited that have ALS said that EMS personnel communicate by radio with hospital emergency room staff when ALS treatment is administered. They added that medical control is also provided in these 16 areas through written protocols containing standing orders for medical treatment.

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## Overcrowded Radio Frequencies and Outmoded Equipment Hamper Delivery of Care

Local EMS officials said that interference due to overcrowded radio frequencies and outmoded equipment is hampering radio communications between ambulances and hospitals. Recent Federal Communications Commission actions to coordinate licensing at the local level and to open new public safety frequencies, however, could alleviate overcrowded airways. Moreover, state officials believe that lifting the prohibition on the purchase of equipment, particularly on communications equipment, could complement the FCC's actions and help modernize local EMS communications equipment.

Ambulances responding to a medical emergency use the radio to obtain guidance on locating the victim, to communicate with a physician when administering treatment, and to identify the most appropriate hospital to take a victim to. Radio communications are also used to transmit electrocardiogram readings from the field to the hospital. Problems in radio communications for any of these purposes can be life threatening.

Of the 18 local areas visited, 13 reported radio communications problems. Table 4.2 shows the nature of the problems; some areas reported problems in both categories.

**Table 4.2: Radio Communications Problems Reported by Local EMS Officials**

Problems	Urban	Rural	Total
Radio interference	7	3	10
Outmoded equipment	5	5	10

## Overcrowded Radio Frequencies

As shown in table 4.2, 10 of the 18 local areas reported unacceptable radio interference from other emergency and nonemergency users licensed to use these channels. Access to radio channels for EMS is governed by the FCC. The agency allocates radio frequencies to groups of users and issues licenses to each user within each group. EMS users are included in a group called the special emergency radio services, which also includes hospitals, school buses, and rescue operations. Of the approximately 75 radio channels that FCC staff indicate are available for special emergency users, 10 have been designated for medical communications, intended primarily for emergency medical services and secondarily for other more routine medical purposes, such as communications between doctors and their offices or interhospital communications. Under FCC rules, EMS providers share the 10 channels with other non-emergency medical related users, such as hospital administration offices, medical schools, and national and state physician organizations.

The FCC licenses multiple users on the same frequencies in a single geographic area to accommodate the demand for frequencies. The granting of licenses for these channels is done on a first-come, first-served basis. There is no policy to give each EMS provider sole use of all or some of the 10 medical channels within a local area, nor are other nonemergency medical users required to obtain clearance from EMS communications centers before using medical channels.

A 1985 FCC report showed that competition for frequencies increased with the growth of these users.<sup>3</sup> As noted in that report, the medical services frequencies are significantly more crowded than the fire and police frequencies in 21 of the largest metropolitan areas in the country. Table 4.3 shows the average number of licensed public safety stations

<sup>3</sup>FCC, Report on Future Public Safety Telecommunications Requirements, June 21, 1985.

per channel in metropolitan areas encompassing the three urban locations we visited—Alameda County, California; Miami, Florida; and Boston, Massachusetts.

**Table 4.3: Average Number of Licensed Public Safety Stations Per Channel<sup>a</sup>**

	EMS group	Police	Fire
Alameda	56	10	4
Miami	46	4	8
Boston	28	8	7

<sup>a</sup>GAO analysis of data contained in 1985 FCC report.

This report further stated that between 1981 and 2000, the demand for additional stations for EMS providers and other users in its group is expected to increase by 245 percent nationwide, by 128 percent in the Alameda area, by 195 percent in Miami, and by 178 percent in Boston.

Of the 10 areas we visited experiencing the overcrowded frequency problem, 5 reported interference from other EMS users, 1 had interference from nonemergency users, and 4 areas reported problems from both sources. For example, Alameda County officials said that fire rescue services in the county routinely experience interference on their assigned medical communications channel due to the large number of nonemergency users in the area. In the Harrisburg, Pennsylvania, area, local EMS officials told us that the medical communication channels are becoming congested as the number of ALS services increase, and as a result, the medical command from a hospital to an ambulance for a particular patient may be heard by another ambulance transporting another patient. In one incident, these officials said that medical treatment instructions intended for a Dauphin County paramedic were heard by a paramedic awaiting medical commands for his patient in neighboring York County. Consequently, the York County paramedic almost administered the wrong treatment before realizing the instructions were not for his patient. San Antonio, Texas, officials said that their emergency radio communications are frequently interrupted by licensed non-emergency use of electronic pagers.

Recognizing the frequency-overcrowding problem, the FCC has recently taken two actions to help resolve it. In April 1986, the FCC designated an organization to review new license applications for the spectrum of special emergency users encompassing both the medical channels and other frequencies assigned to such users as school bus operators. This organization is to recommend frequencies with the least likelihood of interference. The FCC selected the National Association of Business and

Educational Radio, in consortium with several public safety organizations, to advise it on frequency allocation and licensing decisions.

In July 1986, the FCC allocated a new and unused range of frequencies for public safety users, including EMS. Users of these frequencies will have exclusive use of specific channels, according to an FCC official. Since the FCC has not yet defined the frequency band widths of each channel, the number of channels that will be available is unknown at this time. The FCC is developing a national plan to guide the allocation of these new frequencies. This plan could designate channels for particular purpose, such as EMS. To use these new frequencies, however, most local EMS providers would have to purchase new communications equipment, according to an FCC official.

### **Outmoded Equipment Hampers Effective Communications**

Old and outmoded equipment also hampers communications between ambulance and hospitals. Local upgrading of communications equipment could potentially be hastened by modifying the current block grant prohibition on equipment purchases.

Of the 18 local areas we visited, EMS officials in 10 areas cited outmoded equipment as a problem inhibiting EMS communications. Further, officials in nine areas reported that ambulance-hospital communications were hampered by geographical obstacles that could be overcome by new equipment.

For example, Alameda County, California, EMS officials told us that mountainous terrain blocks communications between ambulance crews and hospital physicians in certain areas. Without medical direction, paramedics are not permitted to administer certain life-saving treatments. The county wants to install a new tower to eliminate communications blind spots, but according to local officials, the prohibition on using PHHS block grant funds for equipment purchases impedes the county from updating and replacing old equipment.

Currently, the PHHS block grant prohibits the use of block grant funds for equipment purchases (Public Law 97-35, Sec. 1904(a)(1)(F)). This prohibition did not apply to the prior EMS categorical program. The prohibition responds to congressional concerns that funds would be spent on expensive transportation equipment, such as helicopters, rather than on planning, establishing, and expanding regional EMS systems.

However, the prohibition also applies to communications equipment and has reportedly inhibited some local systems from making needed improvements. Specifically, four of the five states visited using block grant funds for EMS said the prohibition restricts the ability of their local regions to buy new equipment to improve communications. Three of these five states do not provide state funds for local EMS equipment purchases. For example, a state official told us that California imposed this prohibition on its own funds in 1981—the year the block grant was established—but that the state would reconsider its policy if the federal prohibition were lifted. On the other hand, new EMS revenues generated in Pennsylvania from the recently enacted surcharge on moving violations will be available for the purchase of new equipment, according to a state EMS official.

## Conclusions

The survival chances of patients with critical illness or injury are increased by the availability of ALS care. However, ALS is often not available in rural areas, largely due to the low caseloads that limit their ability to recover their fixed costs and to maintain their skills. Therefore, rural areas have to reach beyond their own jurisdictional boundaries in cooperative ventures to engage the resources of other areas.

State and local regulatory actions have promoted widespread availability of ambulance care that meets BLS standards. Further, state and local standards have provided the framework for upgrading local care to the ALS level, promoting the requisite medical confidence and control necessary to perform the advanced medical treatment procedures used in the field.

We did identify one area in the delivery of field care where problems occurred—ambulance-hospital communications. Most local areas reported experiencing communications problems, principally involving overcrowded radio frequencies, and said they had outmoded communications equipment. These problems can cause breakdowns in communications between ambulance personnel in the field and physicians in hospitals giving medical direction.

The FCC has recently moved to ameliorate the problem of overcrowded frequencies. It has designated an organization to help coordinate licensing on existing channels in local areas and has allocated a new and unused range of frequencies for public safety, including EMS. While these actions appear to be promising, further experience will determine how effective they are in providing improved EMS radio communications.



Regarding outmoded communications equipment, both state and federal governments could do more to support the local purchase of new equipment. Efforts undertaken by several states to provide new funds to local areas through surcharges on moving violations appear to offer some promise in helping local areas finance new communications equipment. At the federal level, modifying the current block grant restriction to permit the purchase of communications equipment would offer state and local officials added flexibility and greater opportunities to upgrade EMS communications. It would offer another option to local areas to replace outmoded equipment and to purchase any new equipment that might be needed to access the new radio frequencies recently allocated by the FCC. However, using block grant money for EMS communications equipment would compete with other uses of the limited funds available. Therefore, the Congress will have to decide whether to grant additional flexibility to the states for this purpose.

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## **Matters for Consideration by the Congress**

The Congress should consider modifying the current prohibition on equipment purchase in the PHHS block grant (Public Law 97-35, Sec. 1904(a)(1)(F)) to give states and local areas greater flexibility in acquiring new equipment to upgrade EMS communications.



# Cardiac and Trauma Care: More Systematic Routing of Trauma Victims Needed

An effective EMS system routes the critically ill or injured to specialized medical facilities skilled in treating such cases as major trauma and acute cardiac problems. Appropriate care for cardiac victims is widely available in most hospitals. However, the availability of trauma care is limited to specialized facilities, known as trauma centers, and many local systems have not developed procedures to assure that trauma victims are taken there. As a result, these areas may not be providing trauma patients with the best care available.

Studies and information developed in our fieldwork indicate that economic and political factors, particularly resistance from hospitals without trauma center capability, are impeding many local areas from developing a systematic approach for delivering trauma care. States are in the best position to overcome the barriers to trauma system development, but have done little to encourage the development of local trauma systems. Recent changes being phased in under federal and state health financing programs to contain health care costs might discourage hospitals from specializing in trauma care because the reimbursement rates do not reflect the higher costs of treating the most severely injured patients.

## Systematic Cardiac Care Widely Available

Much is being done for the cardiac patient today. Studies show that the combination of large numbers of citizens who can deliver cardiopulmonary resuscitation, the capability of BLS ambulance services to provide noninvasive but effective care, the ability of ALS ambulance services to provide even more sophisticated levels of invasive treatment, and readily available hospital cardiac emergency care are significant factors in the reduction of death and disability among cardiac victims over the past two decades. A study sponsored by the National Heart, Lung and Blood Institute reported an 18-percent decline in the death rate in heart disease from 1965 to 1975. The report stated that "ambulances and other emergency vehicles are better equipped and staff better trained, resulting in patients being delivered to the hospital in better condition."<sup>1</sup> Death rates from heart attack are down from 700,000 in 1965 to 550,000.

<sup>1</sup>DOT, National Highway Traffic Safety Administration, Emergency Medical Services Branch, Emergency Medical Services 1966-1979 Program Review and Fact Sheet, March 22, 1979, p. 277.

Several studies show that the widespread availability of cardiac care units within hospitals has also increased survival chances.<sup>2</sup> Hospitals we visited in the 18 local areas had emergency rooms that hospital officials indicated were equipped and staffed to deal with cardiac emergencies, as well as cardiac intensive care units and other specialized cardiology services.

### Limited Assurances of Appropriate Trauma Care

Unlike cardiac care, there are fewer specialized trauma care facilities that can provide appropriate care for the most severely injured patients. Therefore, systematically routing trauma patients to appropriate hospitals is important. An effective trauma system should be able to:

- identify hospitals with specialized capability to provide trauma care,
- identify major trauma victims at the scene, and
- require that all major trauma victims be taken to a trauma center.

Figure 5.1: Hospital Trauma Team  
Reviving Patient



<sup>2</sup>Lawrence O. Watkins, M.D., "Why Are Death Rates From Coronary Heart Disease Decreasing?", *Coronary Heart Disease*, vol. 75, no. 8, June 1984, p. 203; William B. Kannel, M.D., and Thomas J. Thorn, "Declining Cardiovascular Mortality," *Circulation*, vol. 70, no. 3, September 1984, p. 334; Robert I. Levy, M.D., "Causes of the Decrease in Cardiovascular Mortality," *American Journal of Cardiology*, vol. 54, August 27, 1984, p. 7c.

## Trauma Systems Shown to Save Lives

According to the American College of Surgeons (ACS), a system designed specifically for trauma care will reduce trauma deaths. A National Academy of Sciences study reports that each year more than 140,000 Americans die from injuries and one in three persons suffers a nonfatal injury. Injuries constitute the most expensive health problem, costing \$75 billion to \$100 billion per year.<sup>3</sup> Various studies in areas around the country have shown that trauma systems can reduce the trauma death rate by as much as 64 percent.

In one study, a team of physicians reported that specialized trauma care could have saved 28 percent of those with head and spinal injuries and 73 percent of those with other injuries in a county where victims were transported to the nearest hospital.<sup>4</sup> In Washington, D.C., a 50-percent reduction in trauma deaths over 5 years has been credited to the development of a trauma care system.<sup>5</sup> A study of San Diego's trauma system showed that the trauma death rate fell by 55 percent after the implementation of a trauma care system.<sup>6</sup>

A systematic approach to trauma care delivery begins at the scene when an emergency medical technician or paramedic determines the nature and severity of the victim's injuries. Using a trauma scoring system based on the patient's vital signs and symptoms, a numerical score is calculated which indicates the level of injury. This severity score determines the level of hospital care needed to treat the injuries. According to trauma expert Dr. R Adams Cowley, trauma is a surgical disease, with most cases requiring immediate surgery. Therefore, severe trauma victims require fast transport with treatment provided en route to a predetermined hospital emergency unit specializing in trauma care, even if other hospitals with lower levels of care are bypassed.

The American College of Surgeons takes the position that transporting the severely injured victim to the nearest hospital without regard to the level of care available is generally no longer acceptable. However, it can be acceptable when transport distances are too great. When the victim

<sup>3</sup>National Academy of Sciences, Injury in America, a Continuing Public Health Problem, 1985, p. 1.

<sup>4</sup>John G. West, M.D., et al., "Systems of Trauma Care: A Study of Two Counties," Archives of Surgery, volume 114, April 1979, p. 460.

<sup>5</sup>As reported in The NHTSA Emergency Medical Services Program and Its Relationship to Highway Safety, DOT, Technical Report DOT HS 806 832, August 1985, p. 5.

<sup>6</sup>The First Year Trauma System Assessment: County of San Diego, August 1984-July 1985, San Diego County Division of Emergency Medical Services, November 1985, synopsis and p. vii.

cannot be delivered to the trauma center within 1 hour of the accident, ACS recommends transporting the victim to a closer facility for stabilization, then transferring the victim to a trauma center.

Trauma centers are distinguished by the immediate availability of specialized physicians, surgeons, and equipment on a 24-hour basis. ACS has defined the resources necessary for optimal care and has established a minimum trauma caseload. A variety of surgical specialty staff should be available, as well as nonsurgical specialists, such as anesthesiologists. ACS also requires specific life support and resuscitation equipment, intensive care units, operating suites, and laboratory services. According to ACS standards, a minimum of 350 trauma patients per year should be treated to be economical, and each physician should treat at least 50 per year to maintain proficiency.

### Trauma Systems Not in Place in 10 of the 18 Areas Visited

Ten of the 18 areas visited—4 urban and 6 rural—do not have fully developed trauma systems, based on our analysis of data provided by local officials. They either do not identify trauma centers, evaluate trauma victims, or practice direct transport of trauma victims to a trauma center or otherwise have transfer agreements. As shown in table 5.1, of the 10 areas, 5 have not identified trauma centers, 5 lack a standard method to identify trauma victims, and 7 do not have procedures for routing trauma victims to the trauma center, either directly or through transfer agreements.

**Table 5.1: Trauma Systems in 18 Local Areas<sup>a</sup>**

	Identified trauma center <sup>b</sup>	Scoring system <sup>c</sup>	Transport practice <sup>d</sup>	Fully developed system
Alameda, CA	No	Yes	Nearest hospital	No
Boston, MA	Yes	Yes	Direct transport	Yes
Dade Co., FL	Yes	Yes	Direct transport	Yes
Sacramento, CA	Yes	Yes	Direct transport	Yes
Placer Co., CA	Yes	Yes	Direct transport & transfer agreement	Yes
Melbourne, FL	No	Yes	Nearest hospital	No
Brevard Co., FL	No	Yes	Nearest hospital	No
Iowa City, IA	Yes	No	Nearest hospital	No
Iowa Co., IA	Yes	No	Direct transport & transfer agreement	No
Harrisburg, PA	Yes	Yes	Direct transport & transfer agreement	Yes
Perry Co., PA	Yes	Yes	Direct transport	Yes
San Antonio, TX	Yes	No	Direct transport	No
Atascosa Co., TX	Yes	No	Direct transport	No
Amarillo, TX	Yes	Yes	Direct transport	Yes
26 counties surrounding Amarillo	Yes	Yes	Direct transport	Yes
West central Iowa	No	No	Nearest hospital	No
Western Massachusetts	Yes	Yes	Nearest hospital	No
Northeast Pennsylvania	No	Yes	Nearest hospital	No

<sup>a</sup>Based on information provided by local EMS officials.

<sup>b</sup>Areas that have identified or categorized hospitals capable of providing trauma care.

<sup>c</sup>Systems used by paramedics and EMTs to identify severity of injury to trauma victims.

<sup>d</sup>Areas that practice direct transport of a trauma victim to an identified trauma center; areas that have transfer agreements when direct transport is too long; or areas that transport to the nearest hospital without regard to its capability.

<sup>e</sup>Areas with all three components of a fully developed trauma system.

The lack of a completely developed trauma system reduces the likelihood that trauma victims are accurately identified and given life-saving care in the most appropriate facility. In three areas, local EMS officials described the following incomplete trauma systems. The rural western Massachusetts area has two hospitals identified as trauma centers. Although a scoring system is used to identify trauma victims, protocols do not require systematic routing to trauma centers when a trauma victim has been identified. In some cases, critically injured patients were

transported to the nearest hospital, which was not an identified trauma center, even though a trauma center was one mile farther.

In the west central Iowa region, no hospital has been identified as a trauma center, and patients are taken to the nearest hospital. The two hospitals we visited in the area are not equipped for trauma care based on ACS standards. They do not have 24-hour availability of specialized surgeons, operating rooms dedicated to emergency trauma cases, or specialized equipment. Further, no transfer agreements are in place to take patients to trauma centers outside the area.

Another example of an incomplete trauma system was identified in San Antonio, Texas. Although ambulance company protocols require that trauma victims be transported directly to the hospital identified as the trauma center, no scoring system is used to differentiate between trauma victims and those with less serious injuries. The extent of injury is not always readily apparent, particularly where internal injuries are involved. Failure to systematically identify the more severely injured victims may deny the benefits of trauma centers to the patients who need them most. Similarly, transporting the less seriously injured to trauma centers can overburden the staff and facilities.

Eight of the 18 areas have fully developed trauma systems (see table 5.1). Not only has a trauma center been identified in those areas, but EMS personnel use a scoring system to assess the condition of trauma victims, who are directly transported or transferred to the identified trauma center. For example, in Sacramento, California, the University of California-Davis Medical Center has been identified as a trauma center to serve several counties. Guidelines require victims identified as severe trauma cases by a scoring system to be transported directly to the trauma center. In adjacent Placer County, because of long transport times to this medical center, EMS officials said that trauma victims are taken to the nearest hospital, stabilized, then transferred to the trauma center through formal written transfer agreements or directly transported by helicopter to the medical center.

Another example of a fully developed trauma system is Dade County, Florida. A local cooperative effort to systematically deliver trauma care has been in operation since September 1984. The Trauma Network, composed of eight identified trauma centers, developed trauma protocols used by the five emergency medical service providers. The protocols require the transport of all severe trauma victims to the closest trauma

center. Each trauma center also contributed \$100,000 toward the purchase of an air ambulance helicopter.

### **Economic and Political Factors Hamper Trauma System Development**

According to state and local officials, resistance from certain hospitals and physicians impedes the development of a trauma system. They said emergency room physicians and administrators of community hospitals often resist the concept of a trauma system with direct transport practices, fearing the loss of patients who would be routed to trauma centers. They are concerned that an overassessment of the severity of injury at the scene may unnecessarily divert patients who do not require specialized care to trauma centers, economically penalizing other hospitals. Also, state EMS officials indicate that some hospitals are concerned that facilities designated as trauma centers would have an advantage in attracting less severely ill or injured patients for nonemergency care.

State governments have provided little leadership in developing trauma systems, partly due to these hospital industry concerns. The six states visited have generally not developed standards for trauma centers or provided guidance to local officials on transport policies. For instance, in Florida, a bill introduced in the mid 1970's to establish a statewide trauma center identification process was defeated due to opposition from the Florida Hospital Association, according to a state EMS official. He said the association was concerned over the loss of patients to hospitals not identified and believed individual hospitals should make their own decisions about whether they should offer trauma services. The Florida EMS office now approves hospitals as trauma centers through a voluntary program, only verifying that the hospitals' applications and list of resources available comply with state standards for trauma centers, based on the ACS standards. The state does not require identified hospitals to maintain minimum caseloads, nor does it require trauma victim identification or direct transport of the victim to the trauma center. The Florida EMS director said that state designation based on minimum caseloads is unnecessary because economic pressures will eventually force hospitals with lower caseloads to discontinue relatively expensive trauma care services.

In Iowa, the local EMS regions selected and recommended hospitals to be formally designated as trauma centers by the state in the late 1970's. Two hospitals not recommended filed lawsuits against the EMS region to stop the identification process. The Iowa district court ordered the EMS region to stop identifying trauma centers because the state lacked



authority; consequently, the state withdrew from the trauma center identification role.

Movement is under way in several states, however, to strengthen the state's role in trauma system regulation. In Pennsylvania, 1985 legislation authorized the Pennsylvania Trauma Systems Foundation to identify trauma centers throughout the state. The nonprofit corporation, composed of state health officials and medical organization representatives, will accredit trauma centers. The act establishes standards of operation for trauma centers, based on ACS guidelines, as well as requiring a minimum trauma caseload for reaccreditation. In Texas, a State Health Coordinating Task Force is reviewing the types of services available at hospitals and is considering recommending that the state legislature implement state-wide criteria for trauma centers, according to state officials.

### **Federal Health Financing Programs May Affect Development of Trauma Systems**

The federal government's health financing programs may also have an effect on trauma care. The Medicare program includes coverage for hospitalization of the elderly and is federally administered. The Medicaid program also includes hospitalization of low-income patients and is state administered in accordance with federal guidelines. In addition to these federally sponsored programs, hospitalization of other patients may be covered by private insurance policies.

Recent changes in hospital payment methods might affect the development of trauma care. Until 1983, Medicare paid hospitals their reasonable costs incurred in treating Medicare beneficiaries. Because the reasonable cost payment system did not give hospitals enough incentive to control their costs, the Congress enacted a prospective payment system for hospitals. Under this system, hospitals are paid a predetermined amount for each Medicare case based on the diagnosis related group (DRG) into which the case falls. DRGs are sets of medically related diagnoses for which the cost of treating patients is expected to be similar.

The DRG payment rates are based on the average costs of hospitals to treat patients falling under the DRG. This payment system is not designed to pay the actual costs of each patient but rather to cover the average costs for all patients treated in a DRG. It is expected that the DRG payment will overcompensate hospitals for less severe cases in a DRG and undercompensate for more severe cases, but on average, an efficient hospital should receive sufficient payment to cover its costs.

Where trauma systems are in place, specialized trauma care centers are likely to receive a disproportionate number of these severely injured patients. To the extent that these trauma centers treat a disproportionate share of more severe cases, studies show that the averaging aspect of the DRG may not adequately compensate them for their costs, even if they are efficient.<sup>7</sup> However, trauma centers may also receive enough less severe trauma cases to offset the payment effect of the severe cases.

Johns Hopkins University is studying the potential effects of DRGs on trauma care in Maryland. For head and spinal injuries, the study found that the state's most specialized trauma center would lose \$5.7 million if the new DRGs were used as the payment method for all their patients seen over the year, representing a loss of \$12,200 per patient.<sup>8</sup>

Officials involved in monitoring health care reimbursement programs observe that the full effect of this new payment policy may not be felt for several years because the system is being phased in during fiscal years 1983-87, and only about 8 percent of Medicare's payments involve trauma care. They added, however, that:

Medicare's new policy is gradually being adopted by Medicaid, which has a greater financial impact on trauma centers. For instance, Medicaid represents close to 17 percent of the Maryland trauma center's income, according to trauma center officials. As of 1986, 12 state Medicaid programs are using DRGs, and five other states are considerably using them. Some private insurers are also moving to adopt DRGs; Blue Cross/Blue Shield is using them in four states and is testing them in two other states.

We discussed the effects of DRGs with the director of reimbursement policy for HHS's Health Care Financing Administration (HCFA), which administers Medicare and Medicaid. He recognizes the potential inequities but has reservations about making any changes at this time to the present DRG rates under Medicare for several reasons. First, as mentioned above, the trauma caseload in Medicare is low, and most trauma centers function as units within hospitals that serve the full range of

<sup>7</sup>See for example, Lenworth M. Jacobs, "The Effect of Prospective Reimbursement on Trauma Patients," *American College of Surgeons Bulletin*, vol. 70, no. 2, February 1985.

<sup>8</sup>This trauma center treats primarily severely injured patients and has its own separate admitting area and staff. In other settings where trauma centers are part of a larger hospital's emergency services, gains realized from treating less severely injured patients may offset the losses. Therefore, the study's findings may not fully apply to other settings.

injury cases and can generate profits to offset any trauma center losses. Second, with regard to modifying DRGs, adjusting for severity requires a methodology that will take several years to develop, although studies are underway. Finally, granting trauma centers an exemption from the DRG-based system could set a precedent for granting exemptions to other specialized care facilities.

Regarding Medicaid, the states develop payment policies, but HCFA reviews and approves the criteria and methodology used by the states to set rates. Currently, HCFA does not specifically determine the effects of state policies on trauma or other specialized care systems in these reviews, according to this HCFA official.

## Conclusions

Severely injured patients in many areas of the country may not receive the best possible trauma care because many local areas have either not designated trauma centers or do not assure that severely injured patients are taken to identified trauma centers.

The identification of a hospital as a trauma center can offer status but may threaten other hospitals in the area with potential loss of patients and prestige. Thus, many local areas, as well as states, have experienced opposition from the medical community to efforts to establish trauma centers. States are in the best position to overcome the barriers to trauma system development. The six we visited had done little to encourage system development, but several are taking steps to establish statewide trauma guidelines.

Recent changes being phased in under federal and state health financing programs to contain health care costs might have the effect of discouraging hospitals from specializing in trauma care because the reimbursement rates do not reflect the higher costs of treating the most severely injured patients. As DRGs are more widely adopted, payments for trauma centers that treat a disproportionate share of severely injured patients may decrease. However, HCFA officials assert that any potential losses may be offset by the financial gains in seeing less severely injured patients drawn to trauma centers. While it is not clear whether a change in federal policy under Medicare should be made to adjust payment rates for the care of severely injured patients, HCFA should further explore whether trauma centers suffer an adverse financial impact as it continues to review the impact of DRGs on financing and the quality of care.

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Although Medicare's trauma caseload is low, HCFA has a role in approving state Medicaid programs where the trauma caseload is considerably higher. Considering the larger financial impact of Medicaid on trauma centers, HCFA should also explore the impact of state reimbursement methods on trauma care when it reviews criteria and methods used by states to set reimbursement rates.

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## **Recommendations to the Secretary of Health and Human Services**

We recommend that the Secretary direct HCFA, as part of its continuing assessment of the DRGs, to determine whether they have an adverse financial impact on trauma centers. The results of this analysis should be considered along with other factors in assessing the need for a change in the trauma-related DRG payment rates. We also recommend that the Secretary direct HCFA to determine whether Medicaid reimbursement rates set by the states have an adverse financial effect on trauma centers as part of its review of each state's reimbursement criteria and methods.

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## Role of EMS in Reduction of Death and Disability

1. The Evaluation of Emergency Medical Services Systems Impact, HHS, 780061.00, 1974.

This review of EMS systems found a reduction in deaths from trauma, cardiac arrest, and poison and a reduction in disability from spinal injuries, burns, and poison.

2. J. P. Ornato and others, "Impact of Improved Emergency Medical Services and Emergency Trauma Care on the Reduction in Mortality From Trauma," The Journal of Trauma, July 1985, vol. 25, no. 7, pp. 575-579.

The authors credit a 24-percent drop in trauma deaths in Nebraska from 1972 to 1982 to improved EMS system.

3. H. Brodsky and others, "Highway Fatal Accidents and Accessibility of Emergency Medical Services," Social Science Medicine, 1983, vol. 17, no. 11, pp. 731-740.

Based on statistical study, the author estimated that traffic fatalities in rural Texas could be cut by 38 percent with increased access to quality EMS.

4. R. Crampton, "The Problem of Cardiac Arrest in the Community," American Journal of Emergency Medicine, May 1984, vol. 2, no. 3, pp. 204-209.

EMS, in the form of citizen cardiopulmonary resuscitation and paramedic defibrillation, has contributed to a 25-percent reduction in cardiac deaths in an area of Virginia.

5. J. W. Bachman, M.D., "Cardiac Arrest in the Community: How to Improve Survival Rates," Postgraduate Medicine, September 1, 1984, vol. 76, no. 3, pp. 85-95.

Cardiac survival improves with rapid response: 4 minutes from onset of symptoms to administration of cardiopulmonary resuscitation and 8 minutes to ALS. The author recommends a means of reducing response time, working with existing resources, and estimates that 80 percent of deaths can be prevented.

## Significance of 911 Emergency Telephone Number

1. Thomas Dayharsh and others, "Update on the National Emergency Number 911," IEEE Transactions on Vehicular Technology, November 1979, vol. 28, no. 4, pp. 292-297.

The authors describe 911 advantages, impediments to implementation, history, and growth.

2. Christine Hackworth, "911; Antidote to Amnesia," Journal of Emergency Medical Services, July 1984, vol. 9, no. 7, pp. 24-31.

The author describes 911 benefits, system types, implementation steps, funding issues, and strategies for dealing with inappropriate use.

3. Susar C. Ivy, "Potential for Citizen Time Savings with 911 Access," IEEE Transactions on Vehicular Technology, November 1979, vol. 28, no. 4, pp. 298-302.

Surveys of emergency callers in three communities without 911 in California, Florida, and Oregon identify time delays and calls to wrong numbers. The author provides an explanation and concludes that 911 would offer significant improvement.

4. Ray Mayron, M.D., and others, "The 911 Emergency Telephone Number: Impact on Emergency Medical Systems Access in a Metropolitan Area," American Journal of Emergency Medicine, November 1984, vol. 2, no. 6, pp. 491-493.

Comparison of calls for emergency ambulance services in Minneapolis-St. Paul, Minnesota, before and after 911 shows decrease in time delays and number of calls per individual request. Authors conclude that 911 is more efficient than other means of accessing EMS system.

5. M. S. Eisenberg, M.D., and others, "Emergency CPR Instruction via Telephone," American Journal of Public Health, January 1985, vol. 75, no. 1, pp. 47-50.

Telephone instruction in cardiopulmonary resuscitation provided by emergency dispatchers in King County, Washington, increases use of this technique as well as cardiac patient survival.

## Importance of ALS

1. Raymond Alexander, M.D., and others, "The Effect of Advanced Life Support and Sophisticated Hospital Systems on Motor Vehicle Mortality," The Journal of Trauma, June 1984, vol. 24, no. 6, pp. 486-490.

This study conducted by Florida Medical Foundation shows that traffic fatalities are lower in counties with ALS and sophisticated hospitals capable of delivering adequate trauma care.

2. Pamela A. Sytkowski and others, "Testing a Model That Evaluates Options for Rural Emergency Medical Service Development," Medical Care, March 1984, vol. 22, no. 3, pp. 202-215.

Based on research conducted in Massachusetts and West Virginia, the authors report the chances of cardiac survival in rural areas increase 2 to 9 percent when ALS is provided and increase 1 percent for each minute response time is shortened.

3. Lenworth M. Jacobs, M.D., and others, "Prehospital Advanced Life Support: Benefits in Trauma," The Journal of Trauma, January 1984, vol. 24, no. 1, pp. 8-13.

The authors compare BLS and ALS for trauma patients in Boston and conclude that ALS results in more favorable outcomes.

## Value of Trauma Systems

1. R. A. Worsing, Jr., "Principles of Prehospital Care of Musculoskeletal Injuries," Emergency Medicine Clinics of North America, May 1984, vol. 2, no. 2, pp. 205-217.

The author describes appropriate prehospital treatment of trauma patients, including assessment, cardiac and respiratory resuscitation, use of MAST trousers and intravenous medication, medical control through radio communication with physician, and immediate transport to a trauma center.

2. Charles F. Frey, M.D., "Accidents and Trauma Care—1983," Surgery Annual, 1984, no. 16, pp. 69-89.

The author estimates that 25 percent of trauma deaths can be prevented by development of trauma systems, based on experience of existing systems in the United States and Germany.



3. C. C. Baker, M.D., and others, "Impact of a Trauma Service on Trauma Care in a University Hospital," The American Journal of Surgery, April 1985, vol. 149, no. 4, pp. 453-458.

A comparison of trauma deaths in Yale-New Haven Hospital before and after the establishment of a trauma service shows a reduction in deaths.

4. John G. West, M.D., and others, "Systems of Trauma Care: A Study of Two Counties," Archives of Surgery, April 1979, vol. 114, pp. 455-460.

Autopsies of trauma victims in two California counties, one with a trauma system and one without, indicate that 28 to 73 percent of deaths could be prevented by the vigorous resuscitation and aggressive surgical intervention available in trauma systems.

5. Richard Cales, M.D., "Trauma Mortality in Orange County: The Effect of Implementation of a Regional Trauma System," Annals of Emergency Medicine, January 1984, vol. 13, no. 1, pp. 1-10.

Following implementation of a trauma system in Orange County, California, salvageable deaths dropped by 50 percent.

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